



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

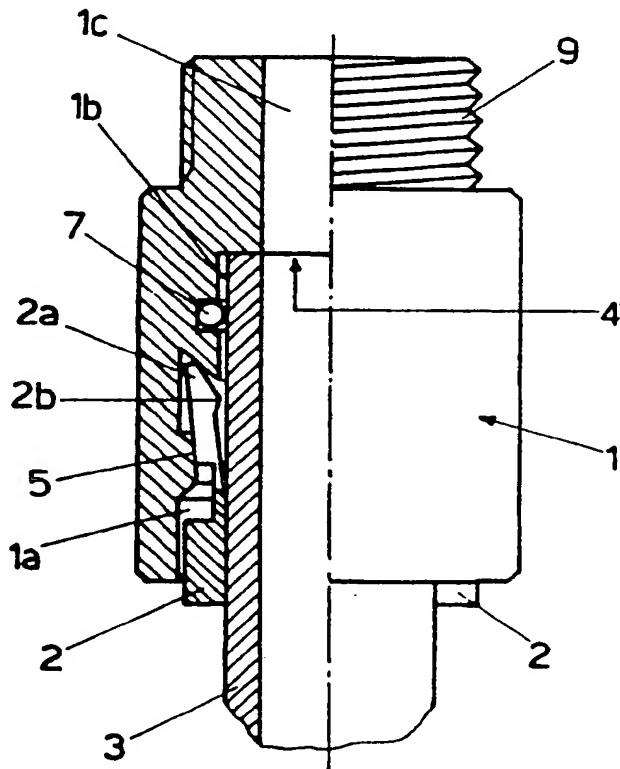
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## (54) Title: A QUICKLY ENGAGEABLE-DISENGAGEABLE PIPE JOINT

## (57) Abstract

A rapidly engageable disengageable joint for hydraulic systems pipes, said joint being also capable of allowing the pipe to undergo a thermal expansion sufficient to avoid the risk of too high tensile stresses that in some cases might even compromise the soundness of the materials so stressed. In the joint in question, the pipe is clamped externally by an annular series of elastic tabs (2a) obtained on a collar (2) into which the pipe is inserted and that houses and slides within a particular seat or housing obtained in said joint, said housing being shaped so that the spreading apart or vice versa the closing up towards the central part can be obtained of said elastic tabs.



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## A QUICKLY ENGAGEABLE-DISENGAGEABLE PIPE JOINT

The present invention relates to a quickly engageable-disengageable joint for hydraulic system pipes, which joint in addition is able to allow the pipe to expand thermally sufficiently to avoid the danger of too high tensile stresses that in some cases could also compromise the soundness of the materials so stressed.

The present finding is to remedy the numerous drawbacks occurring in the quickly engageable joints commercially available at the present time, before all the impossibility of easily and quickly withdrawing the pipe once the same has been inserted into the joint.

When said disengagement operation is to be performed because of any reason, the only possible solution employing the quickly engageable joints available at the present time is that of cutting a length of the pipe near the joint which in most cases is to be disposed of and just in some instances can be recovered by means of a complex extraction procedure of the terminal length of the cut pipe.

Moreover, the quickly engageable joints produced up to now, are affected by a further drawback which is particularly serious above all in the case of employment of metallic pipes, said drawback consisting in that no thermal expansion of the pipe is allowed, or anyway in that the thermal expansion allowed is not sufficient to prevent stresses from arising which might compromise the strength of the materials employed.

The gravity of the drawbacks mentioned above gave rise to the need for a new type of quickly engageable joints, which type could allow an equally rapid disengagement oper-



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ation to be performed and also a remarkable thermal expansion of the pipe to occur.

A further object of the present invention is to supply a joint of such a structural configuration as not to cause 5 the formation inside the same of flow cross sections of lower diameter which inevitably would give rise to pressure drops across the same.

The joint according to the present invention comprises a hollow cylindrical body which bears on its side towards 10 the part for the insertion of the pipe an inlet hole of a diameter higher than the outside diameter of the pipe, so that it can house a long collar having an inside diameter practically equal to the outside diameter of the pipe and 15 ending at one extremity in an annular series of elastically flexible laminae which are obtained through deep diametral notches cut at regular angular spaces.

The seat within which said collar can slide has in its inside part a narrowing rib at about half its depth and 20 said seat ends in a frustum-shaped bottom wall, with which it connects to an intermediate duct length of the joint, said length being of lower diameter. Said intermediate length ends in turn in a flat annular bottom wall or shoulder, with 25 which it connects with the terminal duct length having a diameter exactly equal to the inside diameter of the pipe.

The attention is drawn to the fact that the frustum-shaped connection wall in which the length of the duct wherein the collar houses and can slide ends internally, 30 has its apex towards said collar, i.e. such apex is turned towards the pipe insertion section.

Preferably, the flexible laminae of the collar itself have their tips beveled, so as to make a frustum-shaped

surface oriented concordantly with said frustum-shaped connection wall. Thus, pushing said collar forward till end of the stroke, the radial spreading out of all flexible laminae mentioned above is obtained by means of said frustum-shaped surface against which said laminae go and abut.

5 When the collar is withdrawn from its seat, the narrowing rib mentioned above provided within the same intervenes performing just the opposite action with respect to the action exerted by said frustum-shaped wall, exerting a centripetal pressure on the external back of all such tabs  
10 which, bending towards the inside, tend to close up towards the central part, so allowing the collar to be completely withdrawn in the absence of the pipe. On the contrary, when the pipe is assembled with the joint, its presence prevents said tabs from bending towards the central part to an extent sufficient to allow the collar to be extracted through  
15 the narrow section of said hollow cylindrical body in correspondence with the annular rib provided in the same.

Further in the latter instance, a number of small teeth provided on the inside profile of the flexible tabs would  
20 grip with an ever increasing pressure the outside surface of the pipe, so that said pipe is surely kept from being extracted when the plant is working, even though very high pulling forces are exerted on the same.

However, the pipe can be very simply and quickly disengaged if the collar is kept by hand at a position till end of the stroke while pulling the pipe, which is no longer clamped externally by the small teeth of the tabs, backward with the other hand. Indeed, the tabs are kept in the open position by the frustum-shaped surface against which they exert a contrasting action until the collar is kept pressed  
25 at its end of stroke position.

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The disclosure of the present finding proceeds in the following for better understanding with reference to the enclosed drawings, which are shown just for illustrative and not for limitative purposes, in which drawings:

5 - Figure 1 is an illustration of the joint according to the present invention, half the joint being shown in sectional view and the other half in full view, in which illustration the collar is shown in its end of stroke position with the elastic tabs spread apart;

10 - Figure 2 is an illustration of the joint according to the present invention, half joint being shown in sectional view while the other half is in full view, in which illustration the collar is shown in the backward position with the elastic tabs closed up around the pipe.

15 With reference now to the Figures mentioned above, the joint according to the present invention has a hollow cylindrical body (1), inside which three duct lengths are present that are of decreasing diameter starting from the side where the pipe is inserted.

20 The first pipe length (1a) houses and guides a long collar (2) having inside diameter practically equal to the outside diameter of the pipe (3). Said pipe is inserted into the duct length (1a) till it strikes the bottom wall (4) which is flat and of annular shape, at which the intermediate duct length (1b) connects with the terminal length (1c).

25 The duct length (1a) narrows about halfway because of the presence of an annular rib (5) and it ends beyond the same in a frustum-shaped bottom wall (6), with which it connects to the intermediate duct length (1b) mentioned above, whose diameter is just a little higher than the outer diameter of the pipe (3). A sealing ring (O-ring) (7) is

provided along the intermediate length (1b), said O-ring being recessed within a suitable annular groove.

5 The collar (2) ends inside the duct (1a) in a series of flexible tabs (2a) obtained by means of some deep diametral cuts or notches arranged at regular angular spaces.

Said diametral notches extend longitudinally along the collar (2) till they reach an intermediate zone of said collar of lower thickness, so that said tabs (2a) as a result have a reduced connection section which makes the same 10 more flexible.

In the inside part the profile of each tab (2a) is characterized in that it has a small tooth (2b) intended for gripping the surface of the pipe (3) so as to lock the same when attempt is made at extracting said pipe without 15 keeping the collar (2) in the forward position up to the end of stroke.

Finally the attention is drawn to the end duct length (1c) whose diameter is exactly equal to the inner diameter of the pipe (3) so as not to give rise to changes in the 20 cross section in the path of the joint, as an undesirable local pressure drop would inevitably occur across said section changes.

The reference number (3) points out the thread on the outside surface of the terminal duct length (1c).

## CLAIMS:

1. A quickly engageable-disengageable joint, characterized in that it comprises:
  - a hollow cylindrical body (1) whose inside flow path 5 duct is divided into three lengths (1a, 1b and 1c) of decreasing diameters starting from the insertion side: the first duct length (1a), of higher inner diameter, having, at an intermediate position along its inside surface, an annular rib (5) in correspondence of which a reduced flow 10 path cross section is formed of the duct length (1a), and a frustum-shaped annular bottom wall (6) which is tapered towards the insertion section of the pipe (3); the second duct length (1b), of intermediate diameter, ending in a flat annular bottom wall (4) for the abutment of the pipe (3) 15 inserted into said joint, and having a diameter that is slightly higher than the outer diameter of the pipe (3), the tight seal being obtained through a gasket ring (7) housing within an annular groove that is obtained to that aim on said second duct length (1b); the third duct length (1c) 20 having an outer threaded surface (9) and an inner diameter exactly equal to the inner diameter of the pipe (3);
    - a collar (2) housed within said first duct length (1a) and capable of sliding axially within the same, of inner diameter practically equal to the outer diameter of the 25 pipe (3), and of such length as to protrude always partially out of said first duct length (1a), even at its maximum forward stroke, said collar being provided on the opposite side to that intended for the insertion of said pipe (3) with an annular series of flexible tabs (2a) whose outer 30 surface interferes with said annular rib (5) when said collar (2) is pulled axially backward, so causing a bending

5 towards the inside part of said tabs (2a), and whose free end interferes with said frustum-shaped annular bottom wall (6) when said collar (2) is pushed axially towards its end of stroke position, so causing a bending towards the outside part of said tabs (2a).

2. A quickly engageable-disengageable joint according to claim 1, wherein said flexible tabs (2a) in which said collar (2) ends frontally are obtained by cutting deep diametral notches at regular angular spaces which extend longitudinally in the walls of the collar (2) up to a central length of the collar (2) itself of lower thickness, so that the tabs (2a) have a cross section at their bases of reduced sizes which gives the same a very high flexibility, the inside profile of each tab (2a) being designed so as to 15 have a small tooth (2b).

3. A quickly engageable-disengageable joint according to claims 1 or 2, wherein said flexible tabs (2a) have their free ends beveled on the inside surface so that they can easily interfere with said frustum-shaped annular bottom 20 wall (6).

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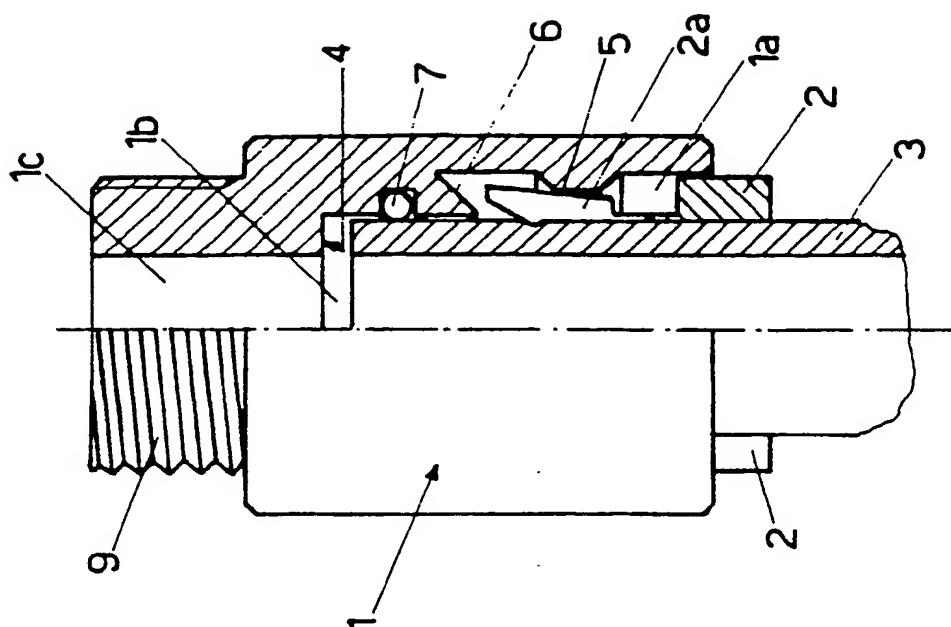


FIG. 2

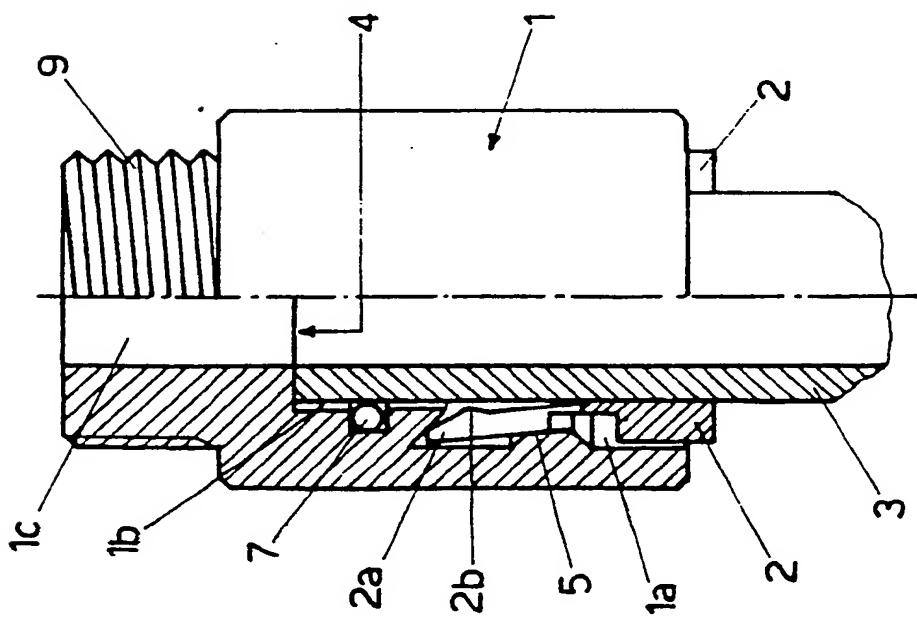


FIG. 1

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/IT 87/00011

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC<sup>4</sup> : F 16 L 37/08

## II. FIELDS SEARCHED

Minimum Documentation Searched \*

Classification System *	Classification Symbols
IPC <sup>4</sup>	F 16 L

Documentation Searched other than Minimum Documentation  
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## III. DOCUMENTS CONSIDERED TO BE RELEVANT\*

Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US, A, 3743326 (THE WEATHERLAND CO.) 3 July 1973 see column 3, lines 33-67; columns 4,5; 1-3 column 6, lines 1-8 --	
A	US, A, 4220361 (THE ARO CORP.) 2 September 1980 see abstract; figures 3-5 --	1
A	DE, A, 3008962 (Y. BARGELE & SOHN KG) 17 September 1981 see page 4, paragraph 2; page 5	1,3
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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

11th May 1987

Date of Mailing of this International Search Report

14 JUN 1987

International Searching Authority

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Signature of Authorized Officer

M. VAN MOL

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

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INTERNATIONAL APPLICATION NO. PCT/IT 87/00011 (SA 16158)

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This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 18/05/87

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3743326	03/07/73	None	
US-A- 4220361	02/09/80	None	
DE-A- 3008962	17/09/81	None	

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